

Honors Chemistry Chapter 10 Review/Study Guide

Name KEY

1. I can define the following:

hydrate - AN IONIC COMPOUND WITH WATER "BUILT-IN" TO THE CRYSTAL STRUCTURE

empirical formula - LOWEST WHOLE # RATIO OF ATOMS IN A COMPOUND

molecular formula - TRUE (ACTUAL) RATIO OF ELEMENTS IN A COMPOUND

stoichiometry - THE STUDY OF QUANTITATIVE RELATIONSHIPS DERIVED FROM CHEMICAL FORMULAS

2. I can convert and show all work to find each of the following:

a. 3.00 moles of hydrogen chloride to grams

$$\frac{3.00 \text{ mol HCl}}{1} \times \frac{36.5 \text{ g HCl}}{1 \text{ mol HCl}} = 109.5 \text{ g HCl}$$

b. 76 L of Oxygen to molecules

$$\frac{76 \text{ L O}_2}{1} \times \frac{1 \text{ mol O}_2}{22.4 \text{ L O}_2} \times \frac{6.02 \times 10^{23} \text{ molecule O}_2}{1 \text{ mol O}_2} = 2.0 \times 10^{24} \text{ molecule O}_2$$

c. 1.204×10^{24} formula units of Calcium Fluoride to grams

$$\frac{1.204 \times 10^{24} \text{ FORMULA UNITS CaF}_2}{1} \times \frac{1 \text{ mol CaF}_2}{6.02 \times 10^{23} \text{ FORMULA UNITS CaF}_2} \times \frac{78.1 \text{ g CaF}_2}{1 \text{ mol CaF}_2} = 1562 \text{ g CaF}_2$$

d. 10.0 Liters of Dinitrogen Trioxide: total atoms, atoms of O and atoms of N

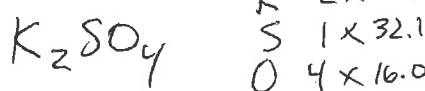
$$\frac{10.0 \text{ L N}_2\text{O}_3}{1} \times \frac{1 \text{ mol N}_2\text{O}_3}{22.4 \text{ L N}_2\text{O}_3} \times \frac{6.02 \times 10^{23} \text{ molecule N}_2\text{O}_3}{1 \text{ mol N}_2\text{O}_3} \times \frac{5 \text{ ATOMS}}{1 \text{ molecule N}_2\text{O}_3} = 1.34 \times 10^{24} \text{ TOTAL ATOMS}$$

$$\frac{1.34 \times 10^{24} \text{ TOTAL ATOMS}}{1} \times \frac{5 \text{ ATOMS O}}{5 \text{ ATOMS TOTAL}} = 8.06 \times 10^{23} \text{ ATOMS O}$$

③ SAME FORMAT AS ② BUT RATIO = $\frac{2 \text{ ATOMS N}}{5 \text{ ATOMS TOTAL}}$

3. I can calculate and show all work to find the % composition of the following compounds:

a. Potassium Sulfate



$$\text{K} \left| \frac{78.2}{174.3} \times 100 = 44.8\% \right.$$

$$\text{S} \left| \frac{32.1}{174.3} \times 100 = 18.4\% \right.$$

$$\text{O} \left| \frac{64.0}{174.3} \times 100 = 36.7\% \right.$$

b. Ammonium Oxide



$$\text{N} \left| \frac{28.0}{52.0} \times 100 = 53.8\% \right.$$

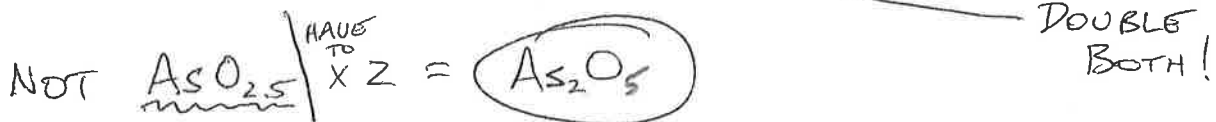
$$\text{H} \left| \frac{8.0}{52.0} \times 100 = 15.4\% \right.$$

$$\text{O} \left| \frac{16.0}{52.0} \times 100 = 30.8\% \right.$$

4. I can calculate and show all work to find the empirical formula of both of the following:

a. A compound contains 32.6 grams of Arsenic and 17.4 grams of Oxygen

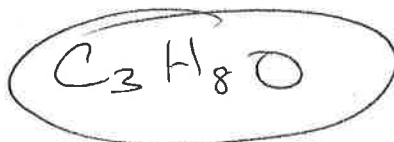
$$\text{As} \left| \frac{32.6}{74.9} = \frac{0.44}{0.44} = 1 \quad \text{O} \left| \frac{17.4}{16.0} = \frac{1.1}{0.44} = 2.5$$



b. A compound contains 60.0 % C, 13.3 % H, and the remaining % Oxygen.

$$\text{C} \left| \frac{60}{12.0} = \frac{5}{1.7} \approx 3 \quad \text{H} \left| \frac{13.3}{1.0} = \frac{13.3}{1.7} \approx 8$$

$$\text{O} \left| \frac{26.7}{16.0} = \frac{1.7}{1.7} = 1$$



5. I can calculate and show all work to find the molecular formula of the following:

A compound is decomposed and found to have 85.7 % Carbon and 14.3 % Hydrogen.
If the molar mass = 42.0 g/mole, what is the molecular formula?

$$\text{C} \left| \frac{85.7}{12.0} = \frac{7.14}{7.14} = 1 \quad \text{H} \left| \frac{14.3}{1.0} = \frac{14.3}{7.14} = 2$$

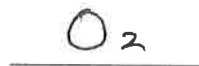
EMPIRICAL
NOT CH₂ ... mm = 14.0 g/mole

IT MUST BE 3 TIMES THAT RATIO SO mm = 42.0 ... C₃H₆ MOLECULAR

6. I can interpret the formula of an atom/molecule based upon written and unwritten implications:

Write the formula for each of the following (choose either O₂ or O for each):

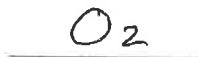
Oxygen gas (implied):



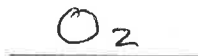
An atom of oxygen:



A molecule of oxygen:



22.4L of oxygen (implied):



Compound contains 7% oxygen:



Oxygen we breathe (implied)

